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Seismic geomorphological analysis of multi-story submarine channel-belt complexes in the Pliocene succession of the Levant Basin, offshore central Israel

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In this study we combine the analysis of a high-resolution three-dimensional seismic reflection dataset and well-logs to characterize a distinct succession characterized by moderate to high-amplitude discontinuous to continuous seismic facies. This interval was deposited during ca. Middle - Late Pliocene, and sandwiched between continuous basin series and mass transport deposit (MTD). Our dataset, located at the foot of the continental slope, offshore central Israel reveal this interval is characterized by multi-storey submarine channel-belt complexes spatio-temporally located in the western part of the study area and restricted to the east by the emplacement of a MTD. We further subdivide the channel-belt complexes into a lower and upper system. The channels in both systems trend N-NW and have a width ranging between 150 m to 350 m , while incising up 50 m within the Pliocene sediments at both levels. Greater populations of well-developed and more sinuous channels are identified in the upper part of the channel complex, suggesting that the interplay between the sedimentary processes and the evolution of channels in the studied interval are heterogeneous. In particular, this may emphasize remarkable changes in spatio-temporal variations in flow volume. Yet, the effect of salt tectonics inflicted by the Messinian evaporites substratum on the morphology of the channel-belt complexes can be downplayed since its associated deformation postdates the evolution of the channels. Considering the available chronology obtained from well-logs and through further comparison with other regional and global climate proxies, we suggest the presence of an apparent periodicity in the evolution of the channels through time. We propose the evolution of these channels during the Pliocene is Nile-related. Furthermore, the channel systems described here for the Pliocene interval may extend the current understanding of the development of slope channels under the influence of juvenile saline giant. Their volumetric study has important implications for deep-water hydrocarbon exploration as these bodies serve as shallow and transitional hydrocarbon reservoirs.